

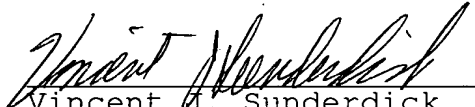
undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

It is respectfully requested that, if necessary to effect a timely response, this paper be considered as a Petition for an Extension of Time sufficient to effect a timely response and shortages in other fees, be charged, or any overpayment in fees be credited, to the Account of Evenson, McKeown, Edwards & Lenahan, P.L.L.C., Deposit Account No. 05-1323

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Respectfully submitted,

  
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TITLE OF THE INVENTION

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Data Bus for a Plurality of Nodes

This application claims the priority of German Patent Application 198 10 294.1, filed August 10, 1998 and PCT/EP99/01177 filed February 23, 1999, the disclosures of which are expressly incorporated by reference herein.

The invention relates to a star-shaped data bus for a plurality of nodes which exchange data [telegrams] with one another over at least one electric line. The circuit-technological realization of a data bus of this type is known in the form of an open collector circuit. An open collector circuit has the disadvantage that at high rates of transmission and many bus nodes a relatively small resistance value must be used as collector resistance in order to achieve a sufficient steepness of the edge of the signal [telegrams] information present in pulse form. This leads to high currents and the necessity of use of power transistors and power resistors as well as high power losses [of power which are too high].

The objective of the invention is to provide a data bus of the type stated initially which makes possible interference-free bus communication with low circuit-technological expenditure even in the case of a large number of bus nodes.

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[Developments of the] The invention [are possible] may be used with nodes which supply electrical output [telegrams] information as well as with nodes which generate optical output signals. The [latter] optical nodes are connected via opto-electric transducers [in such a way] on the data bus so that the signal outputs of the nodes, via each transducer of this type, are fed to the logical decision gate and the output of the logical decision gate is fed, via a common electric-optical transducer or else via individual transducers of this type, to the inputs of the nodes.

For a data bus which is configured as an open collector circuit it is [prior art] known to provide signal form processing devices (cf. US 5,684,831). Therein a device of this type is provided for each node. The configuration

according to the invention for the data bus with a logical decision gate now permits reducing the circuit-technological expenditure drastically. It is only [still required to dispose] necessary to connect a single signal preparation circuit between the logical decision gate and the inputs of the nodes. [, said] This signal preparation circuit [modeling] models the output signal of the logical decision gate with regard to pulse form. This can be accomplished with an adjustment of the form of the output signal to the form of the input signals or [else also] by an adaptation as is described in US 5,684,831[ A]. [Therein] According to this method, the leading edges are flattened in order to be able to distinguish the usable signal from high-frequency interference signals with extreme edge steepness [of edge].

Finally, [in the case of] additional [forms of embodiment] embodiments of the invention[, ] use additional logical decision gates which can be disposed between the output of the signal preparation circuit and at least one [part] of the nodes. [Thereby it] It is when possible to separate certain sections of the data bus, as needed, in order, for example, to separate a faultily functioning bus node or else to set several bus nodes into Sleep mode.

Other objects, advantages and novel features of the present invention will become apparent from the following detailed

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[With the aid of the drawing, the invention will be explained in more detail.]

The single figure shows schematically the layout of the data bus according to the invention which achieves reliable bus communication for a plurality of bus nodes with low circuit-technological expenditure.

A data bus [shown in extract] serves to connect the nodes to one another which supply optical [telegrams] information. The [telegrams] output of the nodes (for the sake of comprehensibility two nodes  $T_n$  and  $T_{n+1}$  are indicated) are fed to inputs of opto-electric signal transducers  $S/E_n$  and  $S/E_{n+1}$  as input signals. The electric signals  $(Di_n, Di_{n+1})$  output from [of] these transducers are linked with an AND gate 1. The number of the input and outputs of the gate corresponds to the number of the bus nodes. The output 2 of the AND gate 1 drives all the inputs  $(Do_n, Do_{n+1})$  of the transducers  $S/E_n$  and  $S/E_{n+1}$ . [These] which supply optical signals in the form of a pulse [which supply these telegrams] to the nodes via optical transmission segments [not represented].

In this manner each node receives all the [telegrams which] information are issued by the other nodes as well as its own [telegram] information.

[As already stated, the] The AND gate 1 has a significantly lower power consumption than the open collector circuit mentioned initially.

[Also shown is the use of a] A signal preparation device SA at the output of the AND gate 1[. Thereby, for example,] eliminates, distortions of signal form, such as can arise through opto-electrical transducers ( $S/E_n$  and  $S/E_{n+1}$ )[, can be eliminated]. For example, NRZ (non-return-to-zero) -coded signals which experience a distortion of up to 30% signal length through the transducer S/E can be brought into a form without pulse distortion.

For the signal preparation in the device SA, for example, the same sampling process can be used which is used for the individual nodes. It is also possible to use a special signal preparation process which takes into account the special auxiliary conditions in the data bus. Thereby data transmission is significantly more robust. It is possible to filter out brief glitches. The demands on the sampling process in the individual nodes can be set lower or the tolerance with respect to pulse distortion grows on one transmission segment.

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The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.

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## Data Bus for a Plurality of Nodes

### Claims

1. Data bus for a plurality of nodes which exchange data telegrams with one another over at least one electric line characterized by the fact that the input signals of the star coupler are present in electrical form, that the star coupler contains a logical decision gate to whose inputs the outputs of the nodes are connected and to which the input signals are fed, and that the output of the decision gate is connected to the inputs of the nodes in a parallel manner.
2. Data bus according to Claim 1 characterized by the fact that at least one part of the nodes is connected via an optical transmission segment to opto-electrical transducers on the star coupler which are connected on the load side or on the line side.
3. Data bus according to Claim 1 or 2 characterized by the fact that a signal preparation circuit is disposed between the logical decision gate and the inputs of the nodes, said signal preparation circuit adjusting the output signal to the input signal with regard to pulse form.

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[illegible]

[figure]

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